

WHAT IS CLAIMED IS:

1. A light-emitting device having a plurality of pixels, each of said plurality of pixels comprising a plurality of memory circuits.

2. A light-emitting device having a plurality of pixels, each of said plurality of pixels comprising  $n \times m$  memory circuits for storing  $n$ -bit ( $n$  is a natural number,  $2 \leq n$ ) digital image signals for  $m$  frames ( $m$  is a natural number,  $1 \leq m$ ).

3. A light-emitting device having a plurality of pixels, each of said plurality of pixels comprising:

a source signal line,  $n$  ( $n$  is a natural number,  $2 \leq n$ ) writing gate signal lines,  $n$  reading gate signal lines,  $n$  writing transistors,  $n$  reading transistors,  $n \times m$  memory circuits for storing  $n$ -bit digital image signals for  $m$  frames ( $m$  is a natural number,  $1 \leq m$ ),  $n$  writing memory circuit selection portions,  $n$  reading memory circuit selection portions, a current supply line, an EL driving transistor, and an EL element, wherein:

each of gate electrodes of said  $n$  writing transistors is electrically connected to any different one of said  $n$  writing gate signal lines, one of a source region and a drain region is electrically connected to said source signal line, the other is electrically connected to any different one signal input portion of said  $n$  writing memory circuit selection portions;

each of said  $n$  writing memory circuit selection portions includes  $m$  signal output portions, said  $m$  signal output portions are respectively electrically connected to signal input portions of said different  $m$  memory circuits;

each of said  $n$  reading memory circuit selection portions includes  $m$  signal input portions, said  $m$  signal input portions are respectively electrically connected to signal output portions of said different  $m$  memory circuits; and

each of gate electrodes of said  $n$  reading transistors is electrically

connected to any different one of said  $n$  reading gate signal lines, one of a source region and a drain region is electrically connected to any different one signal output portion of said  $n$  reading memory circuit selection portions, the other is electrically connected to a gate electrode of said EL driving transistor, one of a source region and a drain region of said EL driving transistor is electrically connected to said current supply line, and the other is electrically connected to one electrode of said EL element.

4. A light-emitting device having a plurality of pixels, each of said plurality of pixels comprising:

$n$  ( $n$  is a natural number,  $2 \leq n$ ) source signal lines, a writing gate signal lines,  $n$  reading gate signal lines,  $n$  writing transistors,  $n$  reading transistors,  $n \times m$  memory circuits for storing  $n$ -bit digital image signals for  $m$  frames ( $m$  is a natural number,  $1 \leq m$ ),  $n$  writing memory circuit selection portions,  $n$  reading memory circuit selection portions, a current supply line, an EL driving transistor, and an EL element, wherein:

each of gate electrodes of said  $n$  writing transistors is electrically connected to said writing gate signal line, one of a source region and a drain region is electrically connected to any different one of said  $n$  source signal lines, the other is electrically connected to any different one signal input portion of said  $n$  writing memory circuit selection portions;

each of said  $n$  writing memory circuit selection portions includes  $m$  signal output portions, said  $m$  signal output portions are respectively electrically connected to signal input portions of said different  $m$  memory circuits;

each of said  $n$  reading memory circuit selection portions includes  $m$  signal input portions, said  $m$  signal input portions are respectively electrically connected to signal output portions of said different  $m$  memory circuits;

each of gate electrodes of said  $n$  reading transistors is electrically connected to any different one of said  $n$  reading gate signal lines, one of a source region and a drain region is electrically connected to any different one signal

output portion of said n reading memory circuit selection portions, the other is electrically connected to a gate electrode of the EL driving transistor, one of a source region and a drain region of said EL driving transistor is electrically connected to said current supply line, and the other is electrically connected to one  
5 electrode of said EL element.

5. A light-emitting device according to claim 3 or 4, wherein:

each of said writing memory circuit selection portions selects any one of said m memory circuits, and is electrically connected to one of said source region  
10 and said drain region of said writing transistor to write said digital image signal into said memory circuit; and

each of said reading memory circuit selection portions selects any one of said memory circuits in which said digital image signal is stored, and is electrically connected to one of said source region and said drain region of said  
15 reading transistor to read out said stored digital image signal.

6. A light-emitting device according to claim 3, further comprising:

shift registers for sequentially outputting sampling pulses in accordance with a clock signal and a start pulse;

20 first latch circuits for holding said n-bit ( $n$  is a natural number,  $2 \leq n$ ) digital image signals in accordance with said sampling pulses;

second latch circuits to which said n-bit digital image signals held in said first latch circuits are transferred; and

bit signal selection switches for sequentially selecting said n-bit digital  
25 image signals transferred to said second latch circuits for each bit and for outputting said n-bit digital image signals to said source signal line.

7. A light-emitting device according to claim 4, further comprising:

shift registers for sequentially outputting sampling pulses in accordance  
30 with a clock signal and a start pulse; and

first latch circuits for holding 1-bit digital image signals of said n-bit (n is a natural number,  $2 \leq n$ ) digital image signals in accordance with said sampling pulses and for outputting said 1-bit digital image signals to said source signal lines.

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8. A light-emitting device according to any one of claims 1 to 4, wherein said memory circuits are static memories (SRAM).

9. A light-emitting device according to any one of claims 1 to 4, wherein  
10 said memory circuits are ferroelectric memories (FeRAM).

10. A light-emitting device according to any one of claims 1 to 4, wherein said memory circuits are dynamic memories (DRAM).

11. A light-emitting device according to any one of claims 1 to 4, wherein  
15 said memory circuits are formed over one selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

12. A light-emitting device according to any one of claims 1 to 4, wherein  
20 said light-emitting device is an electro-luminescence display device.

13. A light-emitting device according to any one of claims 1 to 4, wherein said light-emitting device is incorporated in one selected from the group consisting of a video camera, a personal computer, portable telephone, a head-mount display,  
25 a digital camera, and a portable electronic book.

14. A driving method of a light-emitting device for displaying an image using n-bit (n is a natural number,  $2 \leq n$ ) digital image signals, said light-emitting device comprising a source signal line driver circuit, a gate signal line driver circuit, and a plurality of pixels,  
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said method comprising:

outputting sampling pulses from shift register circuits, and inputting said sampling pulses into latch circuits in said source signal line driver circuits;

holding said digital image signals in accordance with said sampling pulses  
5 in said latch circuits;

transferring said digital image signals into source signal lines;

outputting a gate signal line selection pulse from said gate signal line driver circuit, and selecting a gate signal line;

writing said n-bit digital image signals inputted from said source signal  
10 line into memory circuits at a row where said gate signal line is selected; and

reading out said n-bit digital image signals stored in said memory circuits in each of said plurality of pixels.

15 15. A driving method of a light-emitting device for displaying an image using n-bit ( $n$  is a natural number,  $2 \leq n$ ) digital image signals, said light-emitting device comprising a source signal line driver circuit, a gate signal line driver circuit, and a plurality of pixels,

said method comprising:

outputting sampling pulses from shift registers, and inputting said  
20 sampling pulses into latch circuits in said source signal line driver circuits;

holding said digital image signals in accordance with said sampling pulses in said latch circuits;

transferring said digital image signals into source signal lines;

outputting a gate signal line selection pulse from said gate signal line  
25 driver circuit, and sequentially selecting said gate signal lines from a first row; and

sequentially writing said n-bit digital image signals from said first row into each of said plurality of pixels.

30 16. A driving method of a light-emitting device for displaying an image using n-bit ( $n$  is a natural number,  $2 \leq n$ ) digital image signals, said light-emitting

device comprising a source signal line driver circuit, a gate signal line driver circuit, and a plurality of pixels,  
said method comprising:

outputting sampling pulses from shift registers, and inputting said  
5 sampling pulses into latch circuits in said source signal line driver circuits;

holding said digital image signals in accordance with said sampling pulses  
in said latch circuits;

transferring said digital image signals into source signal lines;

outputting a gate signal line selection pulse from said gate signal line  
10 driver circuit, and selecting an arbitrary gate signal line; and

writing said n-bit digital image signals into each of said plurality of pixels  
at an arbitrary row where said gate signal line is selected.

17. A driving method of a light-emitting device according to claim 14,  
15 wherein in a display period of a still picture, said n-bit digital image signals stored  
in said memory circuits are repeatedly read out to display said still picture, and  
said source signal line driver circuit is stopped.

18. A driving method according to any one of claims 14-16, wherein said  
20 light-emitting device is an electro-luminescence display device.

19. A driving method according to any one of claims 14-16, wherein said  
light-emitting device is incorporated in one selected from the group consisting of a  
video camera, a personal computer, portable telephone, a head-mount display, a  
25 digital camera, and a portable electronic book.